1. Perform the division below. Then, find the intervals that correspond to the quotient in the form $ax^2 + bx + c$ and remainder $r$.

$$\frac{16x^3 - 49x + 32}{x + 2}$$

A. $a \in [16, 18], b \in [31, 38], c \in [12, 17],$ and $r \in [59, 67]$.

B. $a \in [-34, -25], b \in [-69, -63], c \in [-182, -175],$ and $r \in [-324, -318]$.

C. $a \in [-34, -25], b \in [57, 67], c \in [-182, -175],$ and $r \in [385, 392]$.

D. $a \in [16, 18], b \in [-49, -47], c \in [91, 99],$ and $r \in [-253, -246]$.

E. $a \in [16, 18], b \in [-40, -28], c \in [12, 17],$ and $r \in [-1, 5]$.

---

2. Factor the polynomial below completely. Then, choose the intervals the zeros of the polynomial belong to, where $z_1 \leq z_2 \leq z_3$. *To make the problem easier, all zeros are between -5 and 5.*

$$f(x) = 6x^3 - 35x^2 + 66x - 40$$

A. $z_1 \in [-2.69, -2.1],\ z_2 \in [-3, -1.8],$ and $z_3 \in [-1.45, -1.14]$

B. $z_1 \in [-5.19, -4.42],\ z_2 \in [-3, -1.8],$ and $z_3 \in [-0.8, -0.42]$

C. $z_1 \in [1.1, 1.67],\ z_2 \in [1, 2.5],$ and $z_3 \in [2.32, 2.71]$

D. $z_1 \in [-2.18, -1.47],\ z_2 \in [-1.1, -0.6],$ and $z_3 \in [-0.62, -0.23]$

E. $z_1 \in [0.05, 0.53],\ z_2 \in [0.4, 1.5],$ and $z_3 \in [1.95, 2.11]$

---

3. Factor the polynomial below completely. Then, choose the intervals the zeros of the polynomial belong to, where $z_1 \leq z_2 \leq z_3$. *To make the problem easier, all zeros are between -5 and 5.*

$$f(x) = 25x^3 - 45x^2 - 82x - 24$$

A. $z_1 \in [-3.11, -2.79],\ z_2 \in [0.24, 0.6],$ and $z_3 \in [0.38, 0.88]$

B. $z_1 \in [-3.11, -2.79],\ z_2 \in [1.07, 1.31],$ and $z_3 \in [2.14, 2.54]$

C. $z_1 \in [-1.16, -0.39],\ z_2 \in [-0.67, -0.28],$ and $z_3 \in [2.54, 3.27]$

D. $z_1 \in [-2.65, -2.14],\ z_2 \in [-1.42, -1.09],$ and $z_3 \in [2.54, 3.27]$

E. $z_1 \in [-3.11, -2.79],\ z_2 \in [0.09, 0.19],$ and $z_3 \in [1.46, 2.4]$

---

4. Perform the division below. Then, find the intervals that correspond to the quotient in the form $ax^2 + bx + c$ and remainder $r$.

$$\frac{10x^3 - 35x^2 + 42}{x - 3}$$

A. $a \in [28, 31], b \in [54, 58], c \in [160, 169],$ and $r \in [535, 539]$.

B. $a \in [28, 31], b \in [-126, -122], c \in [369, 376],$ and $r \in [-1084, -1081]$.

C. $a \in [5, 15], b \in [-6, -2], c \in [-20, -6],$ and $r \in [-5, 1]$.

D. $a \in [5, 15], b \in [-17, -7], c \in [-34, -25],$ and $r \in [-20, -12]$.

E. $a \in [5, 15], b \in [-65, -61], c \in [193, 197],$ and $r \in [-545, -541]$.

---

5. Perform the division below. Then, find the intervals that correspond to the quotient in the form $ax^2 + bx + c$ and remainder $r$.

$$\frac{12x^3 - 34x^2 - 10x + 7}{x - 3}$$

A. $a \in [31, 39],\ b \in [71, 77],\ c \in [211, 218],$ and $r \in [643, 650]$.

B. $a \in [10, 17],\ b \in [-11, -8],\ c \in [-30, -25],$ and $r \in [-58, -51]$.

C. $a \in [10, 17],\ b \in [-2, 3],\ c \in [-5, -2],$ and $r \in [-6, 0]$.

D. $a \in [10, 17],\ b \in [-75, -64],\ c \in [194, 203],$ and $r \in [-596, -584]$.

E. $a \in [31, 39],\ b \in [-148, -138],\ c \in [415, 418],$ and $r \in [-1243, -1237]$.

---

6. Factor the polynomial below completely, knowing that $x + 3$ is a factor. Then, choose the intervals the zeros of the polynomial belong to, where $z_1 \leq z_2 \leq z_3 \leq z_4$. *To make the problem easier, all zeros are between -5 and 5.*

$$f(x) = 8x^4 + 26x^3 - 37x^2 - 159x - 90$$

A. $z_1 \in [-1.23, -0.19]$, $z_2 \in [0.77, 1.43]$, $z_3 \in [1.38, 2.29]$, and $z_4 \in [2.6, 4.3]$

B. $z_1 \in [-5.3, -4.32]$, $z_2 \in [0.15, 0.47]$, $z_3 \in [1.38, 2.29]$, and $z_4 \in [2.6, 4.3]$

C. $z_1 \in [-3.63, -2.76]$, $z_2 \in [-2.18, -1.85]$, $z_3 \in [-0.83, -0.16]$, and $z_4 \in [0.6, 2.9]$

D. $z_1 \in [-3.63, -2.76]$, $z_2 \in [-2.18, -1.85]$, $z_3 \in [-1.36, -0.79]$, and $z_4 \in [-0.4, 1.4]$

E. $z_1 \in [-2.68, -2.27]$, $z_2 \in [0.61, 0.85]$, $z_3 \in [1.38, 2.29]$, and $z_4 \in [2.6, 4.3]$

---

7. Factor the polynomial below completely, knowing that $x+2$ is a factor. Then, choose the intervals the zeros of the polynomial belong to, where $z_1 \leq z_2 \leq z_3 \leq z_4$. *To make the problem easier, all zeros are between -5 and 5.*

$$f(x) = 12x^4 - 29x^3 - 33x^2 + 116x - 60$$

A. $z_1 \in [-2.5, -1.9]$, $z_2 \in [-1.75, -1.65]$, $z_3 \in [-0.91, -0.74]$, and $z_4 \in [1, 5]$

B. $z_1 \in [-2.5, -1.9]$, $z_2 \in [0.67, 0.79]$, $z_3 \in [1.58, 1.81]$, and $z_4 \in [1, 5]$

C. $z_1 \in [-2.5, -1.9]$, $z_2 \in [0.58, 0.66]$, $z_3 \in [1.23, 1.34]$, and $z_4 \in [1, 5]$

D. $z_1 \in [-2.5, -1.9]$, $z_2 \in [-1.42, -1.31]$, $z_3 \in [-0.72, -0.45]$, and $z_4 \in [1, 5]$

E. $z_1 \in [-3.2, -2.7]$, $z_2 \in [-2.01, -1.99]$, $z_3 \in [-0.58, -0.21]$, and $z_4 \in [1, 5]$

---

8. Perform the division below. Then, find the intervals that correspond to the quotient in the form $ax^2 + bx + c$ and remainder $r$.

$$\frac{20x^3 - 45x^2 - 15x + 45}{x - 2}$$

A. $a \in [18, 23],\ b \in [-8, -2],\ c \in [-30, -22],$ and $r \in [-5, -2]$.

B. $a \in [40, 42],\ b \in [-130, -123],\ c \in [233, 239],$ and $r \in [-425, -423]$.

C. $a \in [18, 23],\ b \in [-87, -83],\ c \in [152, 156],$ and $r \in [-269, -264]$.

D. $a \in [18, 23],\ b \in [-27, -22],\ c \in [-40, -39],$ and $r \in [5, 10]$.

E. $a \in [40, 42],\ b \in [31, 36],\ c \in [52, 57],$ and $r \in [155, 161]$.

---

9. What are the *possible Rational* roots of the polynomial below?

$$f(x) = 6x^3 + 2x^2 + 2x + 2$$

A. $\pm 1, \pm 2$

B. $\pm 1, \pm 2, \pm 3, \pm 6$

C. All combinations of: $\dfrac{\pm 1, \pm 2}{\pm 1, \pm 2, \pm 3, \pm 6}$

D. All combinations of: $\dfrac{\pm 1, \pm 2, \pm 3, \pm 6}{\pm 1, \pm 2}$

E. There is no formula or theorem that tells us all possible Rational roots.

---

10. What are the *possible Integer* roots of the polynomial below?

$$f(x) = 3x^4 + 2x^3 + 6x^2 + 7x + 7$$

A. All combinations of: $\dfrac{\pm 1, \pm 3}{\pm 1, \pm 7}$

B. All combinations of: $\dfrac{\pm 1, \pm 7}{\pm 1, \pm 3}$

C. $\pm 1, \pm 7$

D. $\pm 1, \pm 3$

E. There is no formula or theorem that tells us all possible Integer roots.

---